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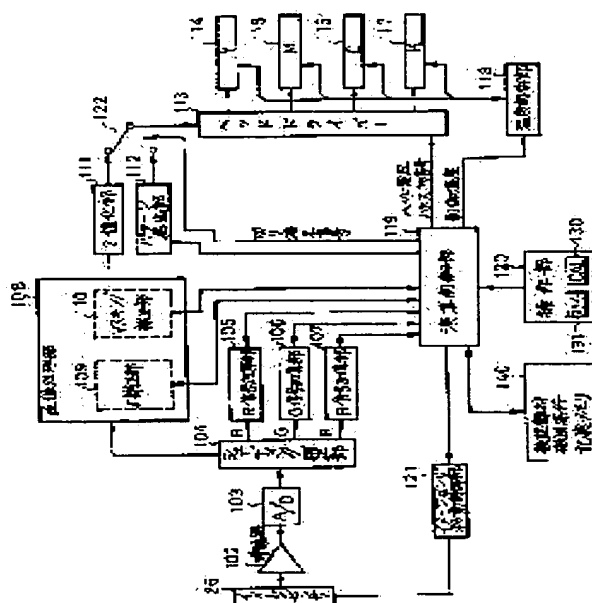
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(54) INK JET RECORDING DEVICE

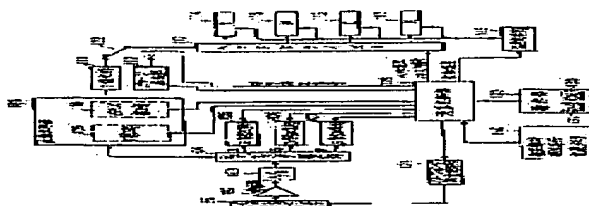
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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the ink jet recording device which performs especially a serial scan and performs image recording about the image formation equipment which used the multi-arm head.

[0002]

[Description of the Prior Art] Conventionally, the ink jet recording device which breathes out ink to a recorded material and performs image recording is known. As for an ink jet recording device, ease [colorization] and miniaturization have the merit of easy **, and it has spread quickly in recent years.

[0003] Drawing 5 is the perspective diagram of such a recording device. In drawing 5, the recorded material 5 rolled in the shape of a roll is pinched with the vertical-scanning roller 3 through the conveyance rollers 1 and 2, and is sent in the direction of f with the drive of the vertical-scanning pulse motor 15 combined with the vertical-scanning roller 3. This recorded material is crossed, guide rails 6 and 7 are placed in parallel, and the recording head unit 9 carried in carriage 8 goes in the direction of right-and-left P. Head 9Y-9Bk of four colors of yellow, a Magenta, cyanogen, and black is carried in carriage 8, and the ink tank of four colors is arranged at this. Although the print width [every] intermittent feed of the arm head 9 is carried out, an arm head is scanned in the direction of P, and a recorded material 5 carries out the regurgitation of the ink drop according to a picture signal, while the recorded material 5 is suspended. For example, when the number of arm heads makes 256 and recording density 400 dots per inch, the print width of the direction of f becomes 16.256mm.

[0004] In the ink jet recording device which performs the above serial scans and performs image recording, the absorption property of an ink drop when an ink

drop is recorded by the recording head 9 on a recorded material 5, and the effect for image grace with the serious amount of vertical scanning of the recorded material 5 with the vertical-scanning roller 3 are done. That is, the band-like joint stripe for every horizontal scanning of a recording head 9 may occur on a recorded material 5 by the size of the amount of vertical scanning of the recording width on which adhesion absorption of the ink drop which was breathed out from two or more ink deliveries of a recording head 9, and was breathed out on the recorded material 5 is carried out, and an image is recorded, and the recorded material 5 with the vertical-scanning roller 3.

[0005] Therefore, according to the recorded material 5 which chose conventionally the recorded material with an absorption property the recording width by the recording head 9 and whose amount of vertical-scanning conveyances of the recorded material 5 with the vertical-scanning roller 3 correspond, and was chosen there, process tolerance of the vertical-scanning roller 3 is made high, the vertical-scanning motor 3 is made into the pulse motor of a high resolution, and the method of deciding the setups of the rotation pulse number of a motor to become the optimal pulse number has been taken.

[0006]

[Problem(s) to be Solved by the Invention] However, if it was going to record an image on two or more kinds of recorded materials with which ink absorption properties differ, since the condition of absorption and a blot of the ink drop on each recorded material changed with above ink jet recording devices, on the recorded material, the problem that a band-like white stripe or a band-like black stripe will occur for every horizontal scanning of a recording head 9 had occurred.

[0007] As a result of absorbing an ink drop on the surface of each recorded material when this phenomenon was explained with reference to drawing 6 and drawing 7, for example recording density carries out discharge record of the ink drop by the recording head 9 of 400dpi on two or more recorded materials A and B with which ink absorption properties differ, and C, and spreading, they are the record dA on each recorded material, dB, and dC. It is set to $dA < dB < dC$.

[0008] Here, the diameter of optimal dot in the case of recording on a recorded material by recording density 400dpi serves as $63.5 \text{ micrometer} \times \sqrt{2} = 89.8 \text{ micrometer} = dB$ that what is necessary is just the circle inscribed in in record pixel pitch 63.5micrometer, a recorded material B is a recorded material with the optimal ink absorption property, and, in a recorded material A, the recorded material of the lack of a blot of an ink drop and a recorded material C turn into a recorded material of the excess of a blot of an ink drop. Moreover, by the

manufacture lot variation of a recorded material B, the absorption property of a recorded material B always is not uniform, it may become the lack of a blot or the same recorded material B may also become the excess of a blot.

[0009] Therefore, in case image recording is performed making the horizontal-scanning migration of the recording head 9 carry out in the direction of arrow head P making an ink drop breathe out from each ink delivery of a recording head 9 on the recorded material with which ink absorption properties differ as shown in drawing 7 It is the recording width WB according [the case of a recorded material B] to a recording head 9 if the amount of vertical-scanning conveyances of a recorded material with the vertical-scanning roller 3 is set as the record pixel width of face L by the recording head 9. An image can be formed without the amount L of vertical-scanning conveyances serving as $L \times WB$, and a joint stripe occurring in the vertical-scanning section.

[0010] However, if an ink drop is recorded on the recorded material A of the lack of a blot of ink by the recording head 9 like a recorded material A, setting the amount of vertical-scanning conveyances of a recorded material to L similarly, it is the recording width WA of the record 9 with a recorded material A. It will become $L > WA$ and the image with which the white stripe-like joint stripe generated the vertical-scanning section will be formed.

[0011] Moreover, like a recorded material C, if an ink drop is recorded on the recorded material of the excess of a blot of ink by the recording head 9, it is the recording width WC of the recording head 9 in a recorded material C. It will be set to $WC > L$ and the image which the black stripe-like joint stripe generated will be formed in the vertical-scanning section.

[0012] Then, in the former, so that the vertical-scanning joint stripe by the recording head on a recorded material may not occur An ink absorption layer to which the absorption property of an ink drop becomes the same at the recording surface side of each recorded material is coated. Make it the recording width W in each recorded material become the same, or process tolerance of the vertical-scanning roller 3 is made high. A pulse motor with high resolution is used for the vertical-scanning pulse motor 15 which furthermore rotates this vertical-scanning roller 3, and the method of switching the rotation pulse number of a motor for every recorded material, and changing the amount L of vertical-scanning conveyances that ink absorption properties differ is taken.

[0013] However, since the ink absorption property of each recorded material is dependent also on the property of the base material of each recorded material in order to coat the recording surface of various recorded materials as mentioned above with an ink absorption layer and to make it the recording width W by the recording head 9 become the same, the coating conditions of an ink absorption

layer differ for every recorded material, and manufacture is very difficult. Moreover, in the case of the latter, since the actual amount of vertical-scanning conveyances was dependent on the process tolerance of a vertical-scanning roller, variation arose in the amount of vertical-scanning conveyances for every equipment, and even if it united the rotation pulse number of a vertical-scanning motor with the recorded material, the problem that the joint stripe of the shape of the shape of a black stripe and a white stripe will occur in the vertical-scanning section too depending on equipment had occurred.

[0014] This invention was accomplished in order to cancel the above-mentioned conventional trouble, and also when a recorded material has various ink absorption properties, it aims at offering the ink jet recording device with which the image of the good grace which the vertical-scanning joint stripe of the shape of the shape of a white stripe and a black stripe does not produce in the record image by the recording head is obtained.

[0015]

[Means for Solving the Problem] For this reason, an ink jet recording device concerning this invention A read means to read an image and to output image data, and a recording head which has a record element which carries out the regurgitation of the ink drop to a recorded material based on a record signal, and moves to a recorded material, A recorded material conveyance means to move a recorded material in the direction which intersects perpendicularly to the migration direction of this recording head, It is the ink jet recording device equipped with a control means which has a storage means and performs control of a record signal to said recording head, and drive control of said recorded material conveyance means. Said control means is recorded on a recorded material by said recording head based on a record signal of a pattern image which was equipped with a pattern image generating means to generate a record signal of a pattern image used as image formation criteria, and this pattern image generating means generated. Based on data which read this record with said read means, compute optimal recorded material conveyance conditions of conveying a recorded material, and it memorizes for a storage means. this -- a configuration characterized by having recorded material conveyance condition amendment mode in which a recorded material is conveyed according to optimal recorded material conveyance conditions tends to attain the aforementioned purpose.

[0016] furthermore, a configuration characterized by said recorded material conveyance conditions being the rotation pulse numbers of a vertical-scanning pulse motor which conveys a recorded material which said recorded material conveyance means has -- furthermore, a storage means to memorize said recorded material conveyance conditions tends to attain the aforementioned

purpose by the configuration characterized by rewriting of recorded material conveyance conditions being possible.

[0017]

[Function] By reading record of a pattern image by the above-mentioned configuration, absorption and the blot condition of the ink drop of a recorded material can be read, and calculation of the optimal recorded material conveyance conditions can be performed by the control means. By setting up the recorded material conveyance condition amendment mode in which the recorded material based on this calculation value is conveyed, controlling conveyance of the recorded material by the recorded material conveyance means by this mode, and performing record by the ink drop Also when recording an image on two or more recorded materials with which ink absorption properties differ, the good image which the muscle of the vertical-scanning joint of the shape of the band-like shape of a white stripe for every horizontal scanning of the recording head by the conditions of absorption and a blot of the ink drop on a recorded material differing and a black stripe does not produce is obtained.

[0018]

[Example] Hereafter, the example of this invention is explained to details with reference to a drawing.

[0019] Drawing 1 is the cross section having shown the configuration of the digital color copying machine which is one example of this invention.

[0020] This digital color copying machine 10 is divided roughly, and consists of two elements. That is, as one general classification element, this copying machine 10 was located up, read the manuscript image in the color, and is equipped with the color image scanner section (it abbreviates to the reader section hereafter.) 12 which outputs digital color picture data. In this reader section 12, while performing various kinds of image processings of digital color picture data, the controller section 14 which has processing facilities, such as an interface with an external device, is built in.

[0021] this reader section 12 is under the original cover board 16, reads the image of the shape of a solid and sheet-like manuscript which were placed downward on the manuscript base which is not a drawing example, and also it builds in the device for reading the sheet-like manuscript of oban size. Moreover, the control unit 120 (shown in drawing 2) connected to the controller section 14 is formed in the 1 side of the upper surface of the reader section 12, and this control unit 120 is formed in order to input various kinds of information as a copying machine.

[0022] In this example, the after-mentioned actuation for amending the recorded material conveyance conditions by the difference in a blot of the record ink on a

recorded material is started by pressing the "CAL" key 130 (shown in drawing 2) prepared in this control unit.

[0023] This controller section 14 is constituted so that the directions about these actuation may be performed to the reader section 12 and the printer section 20 mentioned later according to the information inputted through the control unit 120. Furthermore, when there is the necessity of performing complicated edit processing etc., an advanced image processing becomes possible by changing to the manuscript prevention board 16, attaching a digitizer etc., and connecting this to the controller section 14.

[0024] Moreover, this copying machine 10 is in the condition located under the reader section 12 as other general classification elements, and is equipped with the printer section 20 for recording the color digital picture signal outputted from the controller section 14 on the recording paper. In this one example, the ink-jet printer of the full color which used the recording head of the ink bubble jet recording method by which the printer section 20 was indicated by JP,54-59936,A is used.

[0025] The two above-mentioned general classification elements are mutually disengageable, and installing in the distant location is also set up possible by extending an interconnection cable.

[0026] Thus, the copying machine 10 of this example carries out the printout of the image read in the reader section 12 in the printer section 20.

[0027] And when an operator senses that the joint stripe of the shape of the shape of a black stripe and a white stripe has occurred in the vertical-scanning joint section of the record image recorded on the recorded material in the print section 20, amendment actuation of recorded material conveyance conditions is started by pushing above "CAL key" 130.

[0028] That is, the printer section 20 records a predetermined pattern on a recorded material by the recording head 56, and an operator makes the reader section 12 read this recorded recorded material by pushing "CAL key" 130. And the controller section 14 calculates the optimal recorded material conveyance conditions, in order to convey this recorded material from the reading signal of the pattern image recorded on this recorded material, and it conveys a recorded material on the conveyance conditions acquired by this operation.

[0029] Next, actuation of the copying machine 10 of this example is explained.

[0030] First, in the reader section 12 of a copying machine 10, the image of the exposure lamp 22, a lens 24, and the manuscript that was full color and was placed on manuscript base glass 28 by the image sensors 26 (this example CCD) which can read the Rhine image, the projection image by the projector, or the image of the sheet-like manuscript by the sheet delivery device 30 is read. Next,

the read image will be recorded on the recording paper in the printer section 20 after this by doing in this way and performing various kinds of image processings in the reader section 12 and the controller section 14. here, the recording paper is supplied more nearly alternatively than the sheet paper cassette 32 which contains the cut sheet of small fixed form size to A4 - A3 size this one example, and the roll sheet 34 for performing record of large-sized size (this example -- up to A2 - A1 size).

[0031] Moreover, feeding is made more possible also in feeding (manual paper feed) than the equipment exterior by putting in one sheet of recording paper at a time along with feed section covering from the hand spigot which is not illustrated. Moreover, the pickup roller 40 for taking out one sheet of cut sheet at a time from a sheet paper cassette 32 is arranged above the sheet paper cassette 32 with which the printer section 20 was equipped. The cut sheet taken out with this pickup roller 40 is conveyed even to the 1st roller 44 of feeding with the cut paper feed roller 42.

[0032] On the other hand, a roll sheet 34 is continuously sent out with the roll-sheet feeding roller 46, it is cut into fixed form length by the cutter 48, and even the 1st roller 44 of feeding mentioned above is conveyed. Similarly, the recording paper inserted from the hand spigot is conveyed even to the 1st roller 44 of feeding with the manual bypass roller 50.

[0033] Here, the above-mentioned pickup roller 40, the cut paper feed roller 42, the roll-sheet feeding roller 46, the 1st roller 44 of feeding, and the manual bypass roller 50 are driven by the non-illustrated feed motor (the DC servo motor is used in this example), and they are constituted so that the electromagnetic clutch accompanying each roller can perform on-off control of a rotation drive at any time. Here, if print actuation is started by directions [section / 14 / controller], the recording paper by which selection feeding was carried out from either of the above-mentioned feed paths will be conveyed even to the 1st roller 44 of feeding.

[0034] in order [moreover,] to perform exact paper feed actuation between the paper feed roller 64 arranged in the recording head 56 bottom, and the 2nd roller 52 of feeding arranged in the bottom between the 1st roller 44 of feeding, and the 2nd roller 52 of feeding -- the recording paper -- the specified quantity -- it is constituted so that it may become precocious and a buffer may be made.

[0035] In the printer section 20 which the carrier system of the recording paper consisted of as mentioned above, in the case of the print by the recording head 56, the actuation carriage 58 with which it is equipped with a recording head 56 reciprocates the carriage rail 60 top by the actuation motor 62, and it is constituted so that the scan of a main scanning direction may be performed. And

by the scan of an outward trip, an image is printed in the record paper by the recording head 56, and delivery actuation of the direction of vertical scanning to which only the specified quantity sends the recording paper with the vertical-scanning roller 64 is performed by the scan of a return trip.

[0036] And the printed recording paper is discharged by the paper output tray 66, and completes a series of print actuation.

[0037] Drawing 2 is the block diagram having shown the configuration of the controller section 14 of this example.

[0038] Although 26 is the image sensors for the aforementioned manuscript reading, they are also the color image sensors which read the record image of the predetermined pattern at the time of recorded material conveyance condition amendment actuation. the amplifier with which 102 amplifies the image output of image sensors 26 to a predetermined value, the analog-to-digital converter from which 103 changes an analog picture signal into a digital picture signal, the shading compensation section in which 104 amends shading of optical system and image sensors, and 105, 106 and 107 --each is a signal adder which corresponds the output according to the filter of the color image sensors 26 to the location of image sensors, and samples and adds data.

[0039] 108 is an image processing which changes a digital color picture signal into a color and concentration equivalent to a manuscript. 109 is a part of image-processing section 108, and it is gamma amendment section which adjusts the property about concentration conversion, and 110 is a part of image-processing section 108, and is the masking amendment section which makes color correction.

[0040] 111 is the binary-ized section changed into a binary signal from the picture signal of a multiple value with which gamma amendment and mass kink amendment were made. 112 is the pattern generating section for generating the after-mentioned reference pattern uniquely.

[0041] 122 is the switch section which performs a switch with the image data in which binarization was carried out by the binarization section 111, and the pattern data from the pattern generating section 112. In the usual print mode, a switch signal chooses the binarization image data from the binarization section 111, and the image data from the generating section 112 is chosen in amendment mode.

[0042] 113 is a head driver which controls the print head. 121 is an image-sensors migration control section which controls the passing speed and the location of image sensors 26.

[0043] 114-117 -- respectively -- the print head of cyanogen, a Magenta, yellow, and black -- it is -- 118 -- the print heads 114, 115, 116, and 117 -- it is the

temperature control section which controls each temperature. 119 is an operation control section which controls all these equipments.

[0044] 140 is the memory for memorizing the data of the recorded material conveyance conditions acquired by the operation of the operation control section 119, and the operation control section 119 controls actuation of equipment by this data.

[0045] Next, the amendment actuation in the recorded material conveyance condition amendment mode of this example is explained.

[0046] First, when "CAL key" 130 of a control unit 120 are pushed by the operator as mentioned above, recorded material conveyance condition amendment mode is chosen, and amendment is performed by the following procedures. And if the amendment mode signal from a control unit 120 is told to the operation control section 119, the operation control section 119 will perform a program as shown in drawing 3 .

[0047] If the operation control section 119 starts amendment actuation at step S1 shown in drawing 3 , it directs to create the pattern used as the criteria made to record on a recording head to the pattern generating section 112 at step S2. It has set up beforehand so that the condition of the joint stripe of the vertical-scanning joint section at the time of recording an image on a recorded material by the recording head may be known as a pattern made to record on a recording head here, and the pattern for a recording width by the recording head (for example, total solid width of face) may be recorded by several lines.

[0048] Next, the operation control section 119 switches selection of the image data based on the change section 122 to a pattern generating section side at step S3 after creation termination of the record pattern made to record on a recording head. And feed conveyance is carried out at the Records Department where the recorded material was equipped with the recording head by step S4. After performing record actuation for the line which the pattern record for a recording width of a recording head was started, and was beforehand set up on the recorded material and pattern record of a up to [a recorded material] is completed at step S5 Paper is automatically delivered to the recorded material with which the pattern was recorded, and the sensor unit of the reader section is moved to the initial valve position for image read at step S6.

[0049] And if the start key 131 of a control unit 120 is pushed at step S7 after an operator sets to the manuscript reading section 12 the recorded material with which pattern record by this recording head to which paper was delivered was performed, reading actuation of the pattern record image on the recorded material by the reader section will be started at step S8. And the operation of the recording

width W by the recording head is performed by step S9 based on the pattern record image data on the recorded material read by the reader section, and the amount of optimal vertical-scanning conveyances with the subactuation roller as optimal recorded material conveyance conditions calculates at step S10. And the amount data of optimal vertical-scanning conveyances obtained here is memorized by the recorded material conveyance condition storage memory 140 which consists of RAM etc. at step S11, and a series of amendment actuation at step S12 is ended.

[0050] Here explains an example of the operation method of the above-mentioned optimal recorded material conveyance conditions with reference to drawing 4 .

[0051] Drawing 4 (A), (B), and (C) show the reading data at the time of reading the aforementioned step S4 and the recorded material which conveyed the pattern image for two lines in the amount L of vertical-scanning conveyances as patterns for a recording width on the recorded material of A, B, and C from which ink absorptivity differs, and was recorded by the recording head by S5 by the reader section at step S8.

[0052] Namely, as for drawing 4 (B), drawing 4 (A) shows the reading data based on the reader section when, as for drawing 4 (C), the record pattern for two lines is recorded by the recording head at the recorded material C of the excess of an ink blot at the recorded material B with the optimal ink absorption property to the recorded material A in short of an ink blot, respectively.

[0053] And the reading data in the case of the recorded material A in short of an ink blot As shown in drawing 4 (A), in the joint section of the record pattern for two lines of a recording head The field where the image-sensors output corresponding to a white stripe-like joint stripe is low has occurred, and the reading data in the case of being the recorded material C of the excess of an ink blot As shown in drawing 4 (C), the field where the image-sensors output corresponding to a black stripe-like joint stripe is high has occurred in the joint section of the record pattern for two lines of a recording head.

[0054] Then, by step S9, it is the following, and the recording width by the recording head is made and calculated.

[0055] Namely, the read output data of the record pattern on the recorded material according to image sensors as shown in drawing 4 (A), (B), and (C) and the threshold TH set up beforehand From a large and small value, recording-width $x_{A2}-x_{A1}$ on the recorded material by the recording head, $x_{B2}-x_{B1}$, and $x_{C2}-x_{C1}$ are calculated. Next, the difference of the value of a recording width and the amount of conveyances of a recorded material which

were calculated here is calculated. In the case of the recorded material A in short of an ink blot, it is $2L-(x_{A2}-x_{A1})=2RA$. Obtained $2RA$ From the joint stripe of the shape of a white stripe equivalent to a part occurring It is $L-2RA$ from L about the amount of vertical-scanning conveyances of a recorded material A. Generating of the joint stripe of the vertical-scanning section can be prevented by carrying out.

[0056] therefore, the recorded material A -- receiving -- the amount of optimal vertical-scanning conveyances -- $L-2RA$ it is -- the amount of vertical-scanning conveyances according to a vertical-scanning roller as optimal recorded material conveyance conditions in case this value is memorized in memory 140 and an image is actually recorded on a recorded material A -- $L-2RA$ ** -- the rotation pulse number of a vertical-scanning pulse motor is controlled by the operation control section 119 to carry out.

[0057] moreover -- the same -- an ink blot -- the case of the excessive recorded material C -- $(x_{C2}-x_{C1})-2L=2RC$ Obtained $2RC$ a part -- the amount of vertical-scanning conveyances of the recorded material C since the joint stripe of the shape of a corresponding black stripe occurs -- $L+2RC$ from L By carrying out, generating of the joint stripe of the vertical-scanning section can be prevented. and the recorded material C -- receiving -- the amount of optimal vertical-scanning conveyances -- $L+2RC$ it is -- the amount of vertical-scanning conveyances according to a vertical-scanning roller as optimal recorded material conveyance conditions in case this value is memorized in memory 140 and an image is actually recorded on a recorded material C -- $L+2RC$ ** -- the rotation pulse number of a vertical-scanning pulse motor is controlled by the operation control section 119 to carry out.

[0058] That an operator inputs and chooses selection of recorded materials A, B, and C from a control unit 120, and it should just carry out image recording here Moreover, by using recorded conveyance condition storage memory 140 as the memory of a rewritable type, and carrying out the amount data of optimal vertical-scanning conveyances for the ability rewriting if needed good record image ***** which the joint stripe of the shape of the shape of a white stripe and a black stripe does not generate in the vertical-scanning joint section to many kinds of recorded materials with which ink absorptivity differs -- it becomes like.

[0059] In addition, especially this invention is equipped with means (for example, an electric thermal-conversion object, a laser beam, etc.) to generate heat energy as energy used also in an ink jet recording method in order to make the ink regurgitation perform, and brings about the effect which was excellent in the recording head of the method which makes the change of state of ink occur with

said heat energy, and the recording device. It is because the densification of record and highly minute-ization can be attained according to this method.

[0060] About the typical configuration and typical principle, what is performed using the fundamental principle currently indicated by the U.S. Pat. No. 4723129 specification and the 4740796 specification, for example is desirable. Although this method is applicable to both the so-called mold on demand and a continuous system On the electric thermal-conversion object which is especially arranged corresponding to the sheet and liquid route where the liquid (ink) is held in the case of the mold on demand By impressing at least one driving signal which gives the rapid temperature rise exceeding film boiling corresponding to recording information Since make an electric thermal-conversion object generate heat energy, the heat operating surface of a recording head is made to produce film boiling and the air bubbles in the liquid (ink) corresponding to this driving signal can be formed by one to one as a result, it is effective. A liquid (ink) is made to breathe out through the opening for regurgitation by growth of these air bubbles, and contraction, and at least one drop is formed. If this driving signal is made into the shape of a pulse form, since growth contraction of air bubbles will be performed appropriately instantly, the regurgitation of a liquid (ink) excellent in especially responsibility can be attained, and it is more desirable. As a driving signal of the shape of this pulse form, what is indicated by the U.S. Pat. No. 4463359 specification and the 4345262 specification is suitable. In addition, if the conditions indicated by the U.S. Pat. No. 4313124 specification of invention about the rate of a temperature rise of said heat operating surface are adopted, further excellent record can be performed.

[0061] As a configuration of a recording head, the configuration using the U.S. Pat. No. 4558333 specification and U.S. Pat. No. 4459600 specification which indicate the configuration arranged to the field to which the heat operation section other than the combination configuration (a straight line-like liquid flow channel or right angle liquid flow channel) of a delivery which is indicated by each aforementioned specification, a liquid route, and an electric thermal-conversion object is crooked is also included in this invention. In addition, the effect of this invention is effective also as a configuration based on JP,59-138461,A which indicates the configuration whose puncturing which absorbs the pressure wave of JP,59-123670,A which indicates the configuration which makes a common slit the regurgitation section of an electric thermal-conversion object to two or more electric thermal-conversion objects, or heat energy is made to correspond to the regurgitation section. Namely, no matter the gestalt of a recording head may be what thing, it is because it can record now efficiently certainly according to this invention.

[0062]

[Effect of the Invention] In moving relatively the recording head and recorded material which record by breathing out ink, and performing image recording like explanation, according to this invention, above, the pattern used as the criteria generated with the pattern image generating means is recorded on a recorded material by the recording head, the pattern on this recorded recorded material is read, and it reads with a means. And it is based on the reading data of the pattern image recorded on the recorded material. The optimal recorded material conveyance conditions of conveying a recorded material can be acquired by the control means. By performing image recording on a recorded material, after forming the recorded material conveyance condition amendment mode in which memorize this optimal recorded material conveyance condition for a storage means, and a recorded material is conveyed according to the acquired optimal recorded material conveyance conditions and performing this amendment actuation Also when recording an image on two or more recorded materials with which the case where the variation by the manufacture lot arises in the absorption property of a recorded material differs from an ink absorption property When the conditions of absorption and a blot of the ink drop on a recorded material differ, the good image which the vertical-scanning joint stripe of the shape of the band-like shape of a white stripe for every horizontal scanning of a recording head and a black stripe does not produce is obtained.

[Translation done.]

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TECHNICAL FIELD

[Industrial Application] This invention relates to the ink jet recording device which performs especially a serial scan and performs image recording about the image formation equipment which used the multi-arm head.

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PRIOR ART

[Description of the Prior Art] Conventionally, the ink jet recording device which breathes out ink to a recorded material and performs image recording is known. As for an ink jet recording device, ease [colorization] and miniaturization have the merit of easy **, and it has spread quickly in recent years.

[0003] Drawing 5 is the perspective diagram of such a recording device. In drawing 5 , the recorded material 5 rolled in the shape of a roll is pinched with the vertical-scanning roller 3 through the conveyance rollers 1 and 2, and is sent in the direction of f with the drive of the vertical-scanning pulse motor 15 combined with the vertical-scanning roller 3. This recorded material is crossed, guide rails 6 and 7 are placed in parallel, and the recording head unit 9 carried in carriage 8 goes in the direction of right-and-left P. Head 9Y-9Bk of four colors of yellow, a Magenta, cyanogen, and black is carried in carriage 8, and the ink tank of four colors is arranged at this. Although the print width [every] intermittent feed of the arm head 9 is carried out, an arm head is scanned in the direction of P, and a recorded material 5 carries out the regurgitation of the ink drop according to a picture signal, while the recorded material 5 is suspended. For example, when the number of arm heads makes 256 and recording density 400 dots per inch, the print width of the direction of f becomes 16.256mm.

[0004] In the ink jet recording device which performs the above serial scans and performs image recording, the absorption property of an ink drop when an ink drop is recorded by the recording head 9 on a recorded material 5, and the effect for image grace with the serious amount of vertical scanning of the recorded material 5 with the vertical-scanning roller 3 are done. That is, the band-like joint stripe for every horizontal scanning of a recording head 9 may occur on a recorded material 5 by the size of the amount of vertical scanning of the recording width on which adhesion absorption of the ink drop which was

breathed out from two or more ink deliveries of a recording head 9, and was breathed out on the recorded material 5 is carried out, and an image is recorded, and the recorded material 5 with the vertical-scanning roller 3.

[0005] Therefore, according to the recorded material 5 which chose conventionally the recorded material with an absorption property the recording width by the recording head 9 and whose amount of vertical-scanning conveyances of the recorded material 5 with the vertical-scanning roller 3 correspond, and was chosen there, process tolerance of the vertical-scanning roller 3 is made high, the vertical-scanning motor 3 is made into the pulse motor of a high resolution, and the method of deciding the setups of the rotation pulse number of a motor to become the optimal pulse number has been taken.

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EFFECT OF THE INVENTION

[Effect of the Invention] In moving relatively the recording head and recorded material which record by breathing out ink, and performing image recording like explanation, according to this invention, above, the pattern used as the criteria generated with the pattern image generating means is recorded on a recorded material by the recording head, the pattern on this recorded recorded material is read, and it reads with a means. And based on the reading data of the pattern image recorded on the recorded material, it is a control means about the optimal recorded material conveyance conditions of conveying a recorded material. Can obtain and this optimal recorded material conveyance condition is memorized for a storage means. By performing image recording on a recorded material, after forming the recorded material conveyance condition amendment mode in which a recorded material is conveyed according to the acquired optimal recorded material conveyance conditions and performing this amendment actuation Also when recording an image on two or more recorded materials with which the case where the variation by the manufacture lot arises in the absorption property of a recorded material differs from an ink absorption property When the conditions of absorption and a blot of the ink drop on a recorded material differ, the good image which the vertical-scanning joint stripe of the shape of the band-like shape of a white stripe for every horizontal scanning of a recording head and a black stripe does not produce is obtained.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, if it was going to record an image on two or more kinds of recorded materials with which ink absorption properties differ, since the condition of absorption and a blot of the ink drop on each recorded material changed with above ink jet recording devices, on the recorded material, the problem that a band-like white stripe or a band-like black stripe will occur for every horizontal scanning of a recording head 9 had occurred.

[0007] As a result of absorbing an ink drop on the surface of each recorded material when this phenomenon was explained with reference to drawing 6 and drawing 7 , for example recording density carries out discharge record of the ink drop by the recording head 9 of 400dpi on two or more recorded materials A and B with which ink absorption properties differ, and C, and spreading, they are the record dA on each recorded material, dB, and dC. It is set to $dA < dB < dC$.

[0008] Here, the diameter of optimal dot in the case of recording on a recorded material by recording density 400dpi serves as $63.5 \text{ micrometer} \times \sqrt{2} = 89.8 \text{ micrometer} = dB$ that what is necessary is just the circle inscribed in in record pixel pitch 63.5micrometer, a recorded material B is a recorded material with the optimal ink absorption property, and, in a recorded material A, the recorded material of the lack of a blot of an ink drop and a recorded material C turn into a recorded material of the excess of a blot of an ink drop. Moreover, by the manufacture lot variation of a recorded material B, the absorption property of a recorded material B always is not uniform, it may become the lack of a blot or the same recorded material B may also become the excess of a blot.

[0009] Therefore, in case image recording is performed making the horizontal-scanning migration of the recording head 9 carry out in the direction of arrow head P making an ink drop breathe out from each ink delivery of a

recording head 9 on the recorded material with which ink absorption properties differ as shown in drawing 7 It is the recording width WB according [the case of a recorded material B] to a recording head 9 if the amount of vertical-scanning conveyances of a recorded material with the vertical-scanning roller 3 is set as the record pixel width of face L by the recording head 9. An image can be formed without the amount L of vertical-scanning conveyances serving as $L \times WB$, and a joint stripe occurring in the vertical-scanning section.

[0010] However, if an ink drop is recorded on the recorded material A of the lack of a blot of ink by the recording head 9 like a recorded material A, setting the amount of vertical-scanning conveyances of a recorded material to L similarly, it is the recording width WA of the record 9 with a recorded material A. It will become $L > WA$ and the image with which the white stripe-like joint stripe generated the vertical-scanning section will be formed.

[0011] Moreover, like a recorded material C, if an ink drop is recorded on the recorded material of the excess of a blot of ink by the recording head 9, it is the recording width WC of the recording head 9 in a recorded material C. It will be set to $WC > L$ and the image which the black stripe-like joint stripe generated will be formed in the vertical-scanning section.

[0012] Then, in the former, so that the vertical-scanning joint stripe by the recording head on a recorded material may not occur An ink absorption layer to which the absorption property of an ink drop becomes the same at the recording surface side of each recorded material is coated. Make it the recording width W in each recorded material become the same, or process tolerance of the vertical-scanning roller 3 is made high. A pulse motor with high resolution is used for the vertical-scanning pulse motor 15 which furthermore rotates this vertical-scanning roller 3, and the method of switching the rotation pulse number of a motor for every recorded material, and changing the amount L of vertical-scanning conveyances that ink absorption properties differ is taken.

[0013] However, since the ink absorption property of each recorded material is dependent also on the property of the base material of each recorded material in order to coat the recording surface of various recorded materials as mentioned above with an ink absorption layer and to make it the recording width W by the recording head 9 become the same, the coating conditions of an ink absorption layer differ for every recorded material, and manufacture is very difficult.

Moreover, in the case of the latter, since the actual amount of vertical-scanning conveyances was dependent on the process tolerance of a vertical-scanning roller, variation arose in the amount of vertical-scanning conveyances for every equipment, and even if it united the rotation pulse number of a vertical-scanning motor with the recorded material, the problem that the joint stripe of the shape of

the shape of a black stripe and a white stripe will occur in the vertical-scanning section too depending on equipment had occurred.

[0014] This invention was accomplished in order to cancel the above-mentioned conventional trouble, and also when a recorded material has various ink absorption properties, it aims at offering the ink jet recording device with which the image of the good grace which the vertical-scanning joint stripe of the shape of the shape of a white stripe and a black stripe does not produce in the record image by the recording head is obtained.

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MEANS

[Means for Solving the Problem] For this reason, an ink jet recording device concerning this invention A read means to read an image and to output image data, and a recording head which has a record element which carries out the regurgitation of the ink drop to a recorded material based on a record signal, and moves to a recorded material, A recorded material conveyance means to move a recorded material in the direction which intersects perpendicularly to the migration direction of this recording head, It is the ink jet recording device equipped with a control means which has a storage means and performs control of a record signal to said recording head, and drive control of said recorded material conveyance means. Said control means is recorded on a recorded material by said recording head based on a record signal of a pattern image which was equipped with a pattern image generating means to generate a record signal of a pattern image used as image formation criteria, and this pattern image generating means generated. Based on data which read this record with said read means, compute optimal recorded material conveyance conditions of conveying a recorded material, and it memorizes for a storage means. this -- a configuration characterized by having recorded material conveyance condition amendment mode in which a recorded material is conveyed according to optimal recorded material conveyance conditions tends to attain the aforementioned purpose. [0016] furthermore, a configuration characterized by said recorded material conveyance conditions being the rotation pulse numbers of a vertical-scanning pulse motor which conveys a recorded material which said recorded material conveyance means has -- furthermore, a storage means to memorize said recorded material conveyance conditions tends to attain the aforementioned purpose by the configuration characterized by rewriting of recorded material conveyance conditions being possible.

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OPERATION

[Function] By reading record of a pattern image by the above-mentioned configuration, absorption and the blot condition of the ink drop of a recorded material can be read, and calculation of the optimal recorded material conveyance conditions can be performed by the control means. The recorded material conveyance condition amendment mode in which the recorded material based on this calculation value is conveyed is set up, and it is this mode. Also when recording an image on two or more recorded materials with which ink absorption properties differ by controlling conveyance of the recorded material by the recorded material conveyance means, and performing record by the ink drop, the good image which the muscle of the vertical-scanning joint of the shape of the band-like shape of a white stripe for every horizontal scanning of the recording head by the conditions of absorption and a blot of the ink drop on a recorded material differing and a black stripe does not produce is obtained.

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EXAMPLE

[Example] Hereafter, the example of this invention is explained to details with reference to a drawing.

[0019] Drawing 1 is the cross section having shown the configuration of the digital color copying machine which is one example of this invention.

[0020] This digital color copying machine 10 is divided roughly, and consists of two elements. That is, as one general classification element, this copying machine 10 was located up, read the manuscript image in the color, and is equipped with the color image scanner section (it abbreviates to the reader section hereafter.) 12 which outputs digital color picture data. In this reader section 12, while performing various kinds of image processings of digital color picture data, the controller section 14 which has processing facilities, such as an interface with an external device, is built in.

[0021] this reader section 12 is under the original cover board 16, reads the image of the shape of a solid and sheet-like manuscript which were placed downward on the manuscript base which is not a drawing example, and also it builds in the device for reading the sheet-like manuscript of oban size. Moreover, the control unit 120 (shown in drawing 2) connected to the controller section 14 is formed in the 1 side of the upper surface of the reader section 12, and this control unit 120 is formed in order to input various kinds of information as a copying machine.

[0022] In this example, the after-mentioned actuation for amending the recorded material conveyance conditions by the difference in a blot of the record ink on a recorded material is started by pressing the "CAL" key 130 (shown in drawing 2) prepared in this control unit.

[0023] This controller section 14 is constituted so that the directions about these actuation may be performed to the reader section 12 and the printer section 20 mentioned later according to the information inputted through the control unit

120. Furthermore, when there is the necessity of performing complicated edit processing etc., an advanced image processing becomes possible by changing to the manuscript prevention board 16, attaching a digitizer etc., and connecting this to the controller section 14.

[0024] Moreover, this copying machine 10 is in the condition located under the reader section 12 as other general classification elements, and is equipped with the printer section 20 for recording the color digital picture signal outputted from the controller section 14 on the recording paper. In this one example, the ink-jet printer of the full color which used the recording head of the ink bubble jet recording method by which the printer section 20 was indicated by JP,54-59936,A is used.

[0025] The two above-mentioned general classification elements are mutually disengageable, and installing in the distant location is also set up possible by extending an interconnection cable.

[0026] Thus, the copying machine 10 of this example carries out the printout of the image read in the reader section 12 in the printer section 20.

[0027] And when an operator senses that the joint stripe of the shape of the shape of a black stripe and a white stripe has occurred in the vertical-scanning joint section of the record image recorded on the recorded material in the print section 20, amendment actuation of recorded material conveyance conditions is started by pushing above "CAL key" 130.

[0028] That is, the printer section 20 records a predetermined pattern on a recorded material by the recording head 56, and an operator makes the reader section 12 read this recorded recorded material by pushing "CAL key" 130. And the controller section 14 calculates the optimal recorded material conveyance conditions, in order to convey this recorded material from the reading signal of the pattern image recorded on this recorded material, and it conveys a recorded material on the conveyance conditions acquired by this operation.

[0029] Next, actuation of the copying machine 10 of this example is explained.

[0030] First, in the reader section 12 of a copying machine 10, the image of the exposure lamp 22, a lens 24, and the manuscript that was full color and was placed on manuscript base glass 28 by the image sensors 26 (this example CCD) which can read the Rhine image, the projection image by the projector, or the image of the sheet-like manuscript by the sheet delivery device 30 is read. Next, the read image will be recorded on the recording paper in the printer section 20 after this by doing in this way and performing various kinds of image processings in the reader section 12 and the controller section 14. here, the recording paper is supplied more nearly alternatively than the sheet paper cassette 32 which contains the cut sheet of small fixed form size to A4 - A3 size this one example,

and the roll sheet 34 for performing record of large-sized size (this example -- up to A2 - A1 size).

[0031] Moreover, feeding is made more possible also in feeding (manual paper feed) than the equipment exterior by putting in one sheet of recording paper at a time along with feed section covering from the hand spigot which is not illustrated. Moreover, the pickup roller 40 for taking out one sheet of cut sheet at a time from a sheet paper cassette 32 is arranged above the sheet paper cassette 32 with which the printer section 20 was equipped. The cut sheet taken out with this pickup roller 40 is conveyed even to the 1st roller 44 of feeding with the cut paper feed roller 42.

[0032] On the other hand, a roll sheet 34 is continuously sent out with the roll-sheet feeding roller 46, it is cut into fixed form length by the cutter 48, and even the 1st roller 44 of feeding mentioned above is conveyed. Similarly, the recording paper inserted from the hand spigot is conveyed even to the 1st roller 44 of feeding with the manual bypass roller 50.

[0033] Here, the above-mentioned pickup roller 40, the cut paper feed roller 42, the roll-sheet feeding roller 46, the 1st roller 44 of feeding, and the manual bypass roller 50 are driven by the non-illustrated feed motor (the DC servo motor is used in this example), and they are constituted so that the electromagnetic clutch accompanying each roller can perform on-off control of a rotation drive at any time. Here, if print actuation is started by directions [section / 14 / controller], the recording paper by which selection feeding was carried out from either of the above-mentioned feed paths will be conveyed even to the 1st roller 44 of feeding.

[0034] in order [moreover,] to perform exact paper feed actuation between the paper feed roller 64 arranged in the recording head 56 bottom, and the 2nd roller 52 of feeding arranged in the bottom between the 1st roller 44 of feeding, and the 2nd roller 52 of feeding -- the recording paper -- the specified quantity -- it is constituted so that it may become precocious and a buffer may be made.

[0035] In the printer section 20 which the carrier system of the recording paper consisted of as mentioned above, in the case of the print by the recording head 56, the actuation carriage 58 with which it is equipped with a recording head 56 reciprocates the carriage rail 60 top by the actuation motor 62, and it is constituted so that the scan of a main scanning direction may be performed. And by the scan of an outward trip, an image is printed in the record paper by the recording head 56, and delivery actuation of the direction of vertical scanning to which only the specified quantity sends the recording paper with the vertical-scanning roller 64 is performed by the scan of a return trip.

[0036] And the printed recording paper is discharged by the paper output tray 66,

and completes a series of print actuation.

[0037] Drawing 2 is the block diagram having shown the configuration of the controller section 14 of this example.

[0038] Although 26 is the image sensors for the aforementioned manuscript reading, they are also the color image sensors which read the record image of the predetermined pattern at the time of recorded material conveyance condition amendment actuation. the amplifier with which 102 amplifies the image output of image sensors 26 to a predetermined value, the analog-to-digital converter from which 103 changes an analog picture signal into a digital picture signal, the shading compensation section in which 104 amends shading of optical system and image sensors, and 105, 106 and 107 -- each is a signal adder which corresponds the output according to the filter of the color image sensors 26 to the location of image sensors, and samples and adds data.

[0039] 108 is an image processing which changes a digital color picture signal into a color and concentration equivalent to a manuscript. 109 is a part of image-processing section 108, and it is gamma amendment section which adjusts the property about concentration conversion, and 110 is a part of image-processing section 108, and is the masking amendment section which makes color correction.

[0040] 111 is the binary-ized section changed into a binary signal from the picture signal of a multiple value with which gamma amendment and mass kink amendment were made. 112 is the pattern generating section for generating the after-mentioned reference pattern uniquely.

[0041] 122 is the switch section which performs a switch with the image data in which binarization was carried out by the binarization section 111, and the pattern data from the pattern generating section 112. In the usual print mode, a switch signal chooses the binarization image data from the binarization section 111, and the image data from the generating section 112 is chosen in amendment mode.

[0042] 113 is a head driver which controls the print head. 121 is an image-sensors migration control section which controls the passing speed and the location of image sensors 26.

[0043] 114-117 -- respectively -- the print head of cyanogen, a Magenta, yellow, and black -- it is -- 118 -- the print heads 114, 115, 116, and 117 -- it is the temperature control section which controls each temperature. 119 is an operation control section which controls all these equipments.

[0044] 140 is the memory for memorizing the data of the recorded material conveyance conditions acquired by the operation of the operation control section 119, and the operation control section 119 controls actuation of equipment by this

data.

[0045] Next, the amendment actuation in the recorded material conveyance condition amendment mode of this example is explained.

[0046] First, when "CAL key" 130 of a control unit 120 are pushed by the operator as mentioned above, recorded material conveyance condition amendment mode is chosen, and amendment is performed by the following procedures. And if the amendment mode signal from a control unit 120 is told to the operation control section 119, the operation control section 119 will perform a program as shown in drawing 3 .

[0047] If the operation control section 119 starts amendment actuation at step S1 shown in drawing 3 , it directs to create the pattern used as the criteria made to record on a recording head to the pattern generating section 112 at step S2. It has set up beforehand so that the condition of the joint stripe of the vertical-scanning joint section at the time of recording an image on a recorded material by the recording head may be known as a pattern made to record on a recording head here, and the pattern for a recording width by the recording head (for example, total solid width of face) may be recorded by several lines.

[0048] Next, the operation control section 119 switches selection of the image data based on the change section 122 to a pattern generating section side at step S3 after creation termination of the record pattern made to record on a recording head. And feed conveyance is carried out at the Records Department where the recorded material was equipped with the recording head by step S4. After performing record actuation for the line which the pattern record for a recording width of a recording head was started, and was beforehand set up on the recorded material and pattern record of a up to [a recorded material] is completed at step S5 Paper is automatically delivered to the recorded material with which the pattern was recorded, and the sensor unit of the reader section is moved to the initial valve position for image read at step S6.

[0049] And if the start key 131 of a control unit 120 is pushed at step S7 after an operator sets to the manuscript reading section 12 the recorded material with which pattern record by this recording head to which paper was delivered was performed, reading actuation of the pattern record image on the recorded material by the reader section will be started at step S8. And the operation of the recording width W by the recording head is performed by step S9 based on the pattern record image data on the recorded material read by the reader section, and the amount of optimal vertical-scanning conveyances with the subactuation roller as optimal recorded material conveyance conditions calculates at step S10. And the amount data of optimal vertical-scanning conveyances obtained here is

memorized by the recorded material conveyance condition storage memory 140 which consists of RAM etc. at step S11, and a series of amendment actuation at step S12 is ended.

[0050] Here explains an example of the operation method of the above-mentioned optimal recorded material conveyance conditions with reference to drawing 4 .

[0051] Drawing 4 (A), (B), and (C) show the reading data at the time of reading the aforementioned step S4 and the recorded material which conveyed the pattern image for two lines in the amount L of vertical-scanning conveyances as patterns for a recording width on the recorded material of A, B, and C from which ink absorptivity differs, and was recorded by the recording head by S5 by the reader section at step S8.

[0052] Namely, as for drawing 4 (B), drawing 4 (A) shows the reading data based on the reader section when, as for drawing 4 (C), the record pattern for two lines is recorded by the recording head at the recorded material C of the excess of an ink blot at the recorded material B with the optimal ink absorption property to the recorded material A in short of an ink blot, respectively.

[0053] And the reading data in the case of the recorded material A in short of an ink blot As shown in drawing 4 (A), in the joint section of the record pattern for two lines of a recording head The field where the image-sensors output corresponding to a white stripe-like joint stripe is low has occurred, and the reading data in the case of being the recorded material C of the excess of an ink blot As shown in drawing 4 (C), the field where the image-sensors output corresponding to a black stripe-like joint stripe is high has occurred in the joint section of the record pattern for two lines of a recording head.

[0054] Then, by step S9, it is the following, and the recording width by the recording head is made and calculated.

[0055] Namely, the read output data of the record pattern on the recorded material according to image sensors as shown in drawing 4 (A), (B), and (C) and the threshold TH set up beforehand From a large and small value, recording-width $x_{A2}-x_{A1}$ on the recorded material by the recording head, $x_{B2}-x_{B1}$, and $x_{C2}-x_{C1}$ are calculated. Next, the difference of the value of a recording width and the amount of conveyances of a recorded material which were calculated here is calculated. In the case of the recorded material A in short of an ink blot, it is $2L-(x_{A2}-x_{A1})=2RA$. Obtained $2RA$ From the joint stripe of the shape of a white stripe equivalent to a part occurring It is $L-2RA$ from L about the amount of vertical-scanning conveyances of a recorded material A. Generating of the joint stripe of the vertical-scanning section can be prevented by

carrying out.

[0056] therefore, the recorded material A -- receiving -- the amount of optimal vertical-scanning conveyances -- $L-2RA$ it is -- the amount of vertical-scanning conveyances according to a vertical-scanning roller as optimal recorded material conveyance conditions in case this value is memorized in memory 140 and an image is actually recorded on a recorded material A -- $L-2RA$ ** -- the rotation pulse number of a vertical-scanning pulse motor is controlled by the operation control section 119 to carry out.

[0057] moreover -- the same -- an ink blot -- the case of the excessive recorded material C -- $(xC2-xC1)-2L=2RC$ Obtained $2RC$ a part -- the amount of vertical-scanning conveyances of the recorded material C since the joint stripe of the shape of a corresponding black stripe occurs -- $L+2RC$ from L By carrying out, generating of the joint stripe of the vertical-scanning section can be prevented. and the recorded material C -- receiving -- the amount of optimal vertical-scanning conveyances -- $L+2RC$ it is -- the amount of vertical-scanning conveyances according to a vertical-scanning roller as optimal recorded material conveyance conditions in case this value is memorized in memory 140 and an image is actually recorded on a recorded material C -- $L+2RC$ ** -- the rotation pulse number of a vertical-scanning pulse motor is controlled by the operation control section 119 to carry out.

[0058] That an operator inputs and chooses selection of recorded materials A, B, and C from a control unit 120, and it should just carry out image recording here Moreover, by using recorded conveyance condition storage memory 140 as the memory of a rewritable type, and carrying out the amount data of optimal vertical-scanning conveyances for the ability rewriting if needed good record image ***** which the joint stripe of the shape of the shape of a white stripe and a black stripe does not generate in the vertical-scanning joint section to many kinds of recorded materials with which ink absorptivity differs -- it becomes like.

[0059] In addition, especially this invention is equipped with means (for example, an electric thermal-conversion object, a laser beam, etc.) to generate heat energy as energy used also in an ink jet recording method in order to make the ink regurgitation perform, and brings about the effect which was excellent in the recording head of the method which makes the change of state of ink occur with said heat energy, and the recording device. It is because the densification of record and highly minute-ization can be attained according to this method.

[0060] About the typical configuration and typical principle, what is performed using the fundamental principle currently indicated by the U.S. Pat. No. 4723129 specification and the 4740796 specification, for example is desirable. Although

this method is applicable to both the so-called mold on demand and a continuous system On the electric thermal-conversion object which is especially arranged corresponding to the sheet and liquid route where the liquid (ink) is held in the case of the mold on demand By impressing at least one driving signal which gives the rapid temperature rise exceeding film boiling corresponding to recording information Since make an electric thermal-conversion object generate heat energy, the heat operating surface of a recording head is made to produce film boiling and the air bubbles in the liquid (ink) corresponding to this driving signal can be formed by one to one as a result, it is effective. A liquid (ink) is made to breathe out through the opening for regurgitation by growth of these air bubbles, and contraction, and at least one drop is formed. If this driving signal is made into the shape of a pulse form, since growth contraction of air bubbles will be performed appropriately instantly, the regurgitation of a liquid (ink) excellent in especially responsibility can be attained, and it is more desirable. As a driving signal of the shape of this pulse form, what is indicated by the U.S. Pat. No. 4463359 specification and the 4345262 specification is suitable. In addition, if the conditions indicated by the U.S. Pat. No. 4313124 specification of invention about the rate of a temperature rise of said heat operating surface are adopted, further excellent record can be performed.

[0061] As a configuration of a recording head, the configuration using the U.S. Pat. No. 4558333 specification and U.S. Pat. No. 4459600 specification which indicate the configuration arranged to the field to which the heat operation section other than the combination configuration (a straight line-like liquid flow channel or right angle liquid flow channel) of a delivery which is indicated by each aforementioned specification, a liquid route, and an electric thermal-conversion object is crooked is also included in this invention. In addition, the effect of this invention is effective also as a configuration based on JP,59-138461,A which indicates the configuration whose puncturing which absorbs the pressure wave of JP,59-123670,A which indicates the configuration which makes a common slit the regurgitation section of an electric thermal-conversion object to two or more electric thermal-conversion objects, or heat energy is made to correspond to the regurgitation section. Namely, no matter the gestalt of a recording head may be what thing, it is because it can record now efficiently certainly according to this invention.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the cross section having shown the configuration of the color copying machine which is one example.

[Drawing 2] It is the block diagram of the image-processing section of an example.

[Drawing 3] It is the flow chart which showed control of an example.

[Drawing 4] It is pattern image comparison drawing for explaining the operation method of an example.

[Drawing 5] It is the important section perspective diagram of the printer section of a recording device.

[Drawing 6] It is explanatory drawing having shown the record trouble of equipment conventionally.

[Drawing 7] It is explanatory drawing having shown the record trouble of equipment conventionally.

[Description of Notations]

3 Vertical-Scanning Roller

5 Recorded Material

8 Carriage

9 Recording Head

10 Digital Color Copying Machine

12 Reader Section

14 Controller Section

15 Vertical-Scanning Pulse Motor

20 Printer Section

26 Image Sensors

28 Manuscript Base Glass

30 Sheet Delivery Device
32 Sheet Paper Cassette
52 2nd Roller of Feeding
56 Recording Head
58 Scan Carriage
62 Scan Motor
64 Vertical-Scanning Roller
66 Paper Output Tray
112 Pattern Generating Section
113 Head Driver
114-117 Print head
119 Operation Control Section
121 Migration Control Section
122 Signal Switch Section
130 Proofreading Key
131 Read Initiation Key
140 Recorded Material Conveyance Condition Storage Memory

[Translation done.]

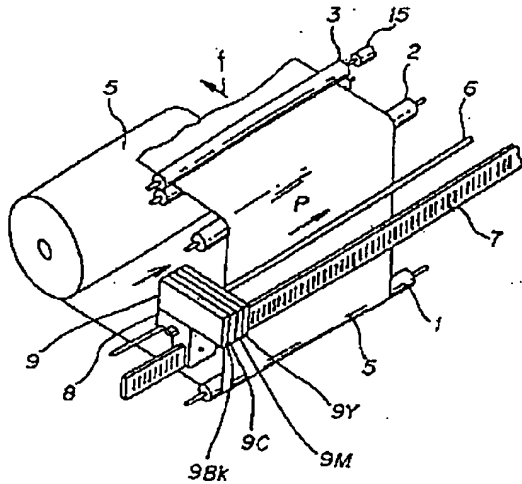
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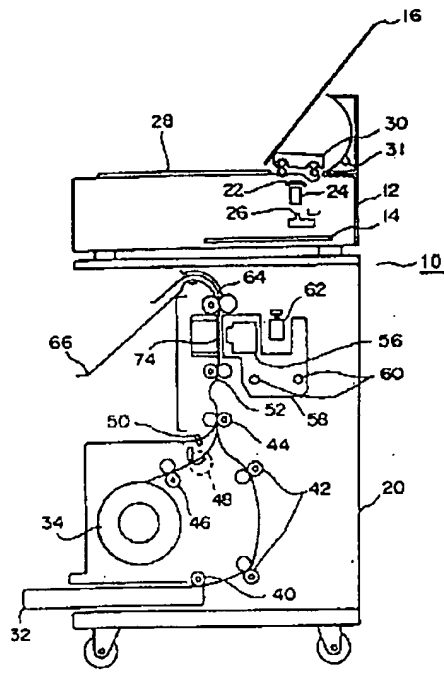
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DRAWINGS

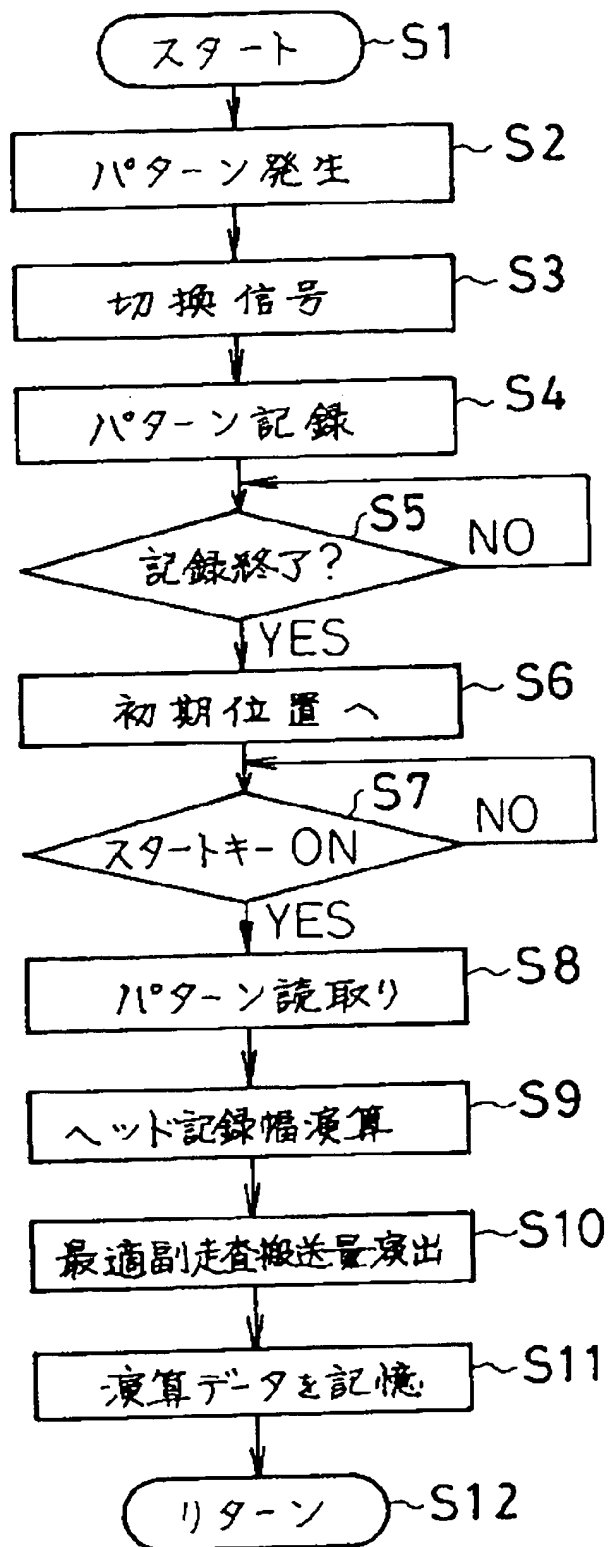
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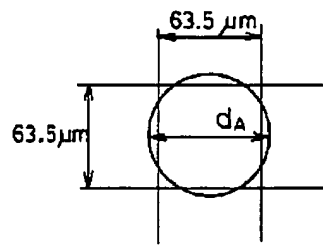
[Drawing 1]



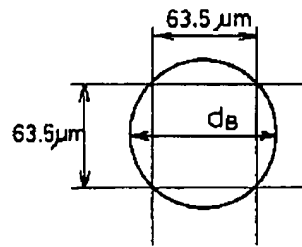
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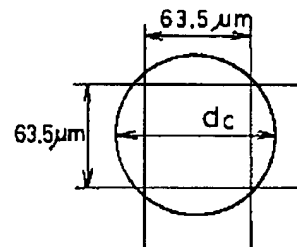
[Drawing 6]



被記録材 A

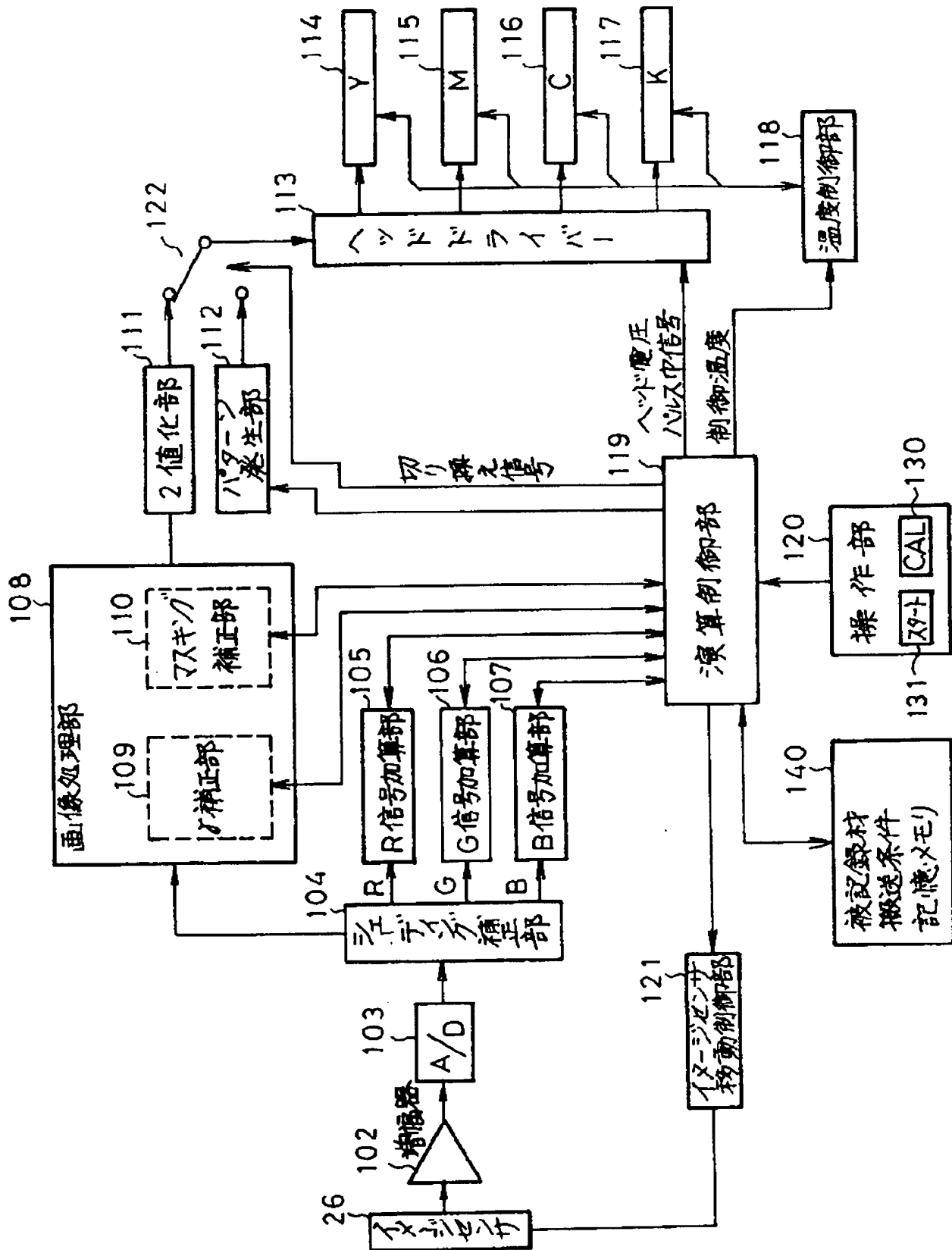


被記録材 B



被記録材 C

[Drawing 2]



[Drawing 4]

